FAILURE TO LAUNCH: COST OF LIVING AND LIVING STANDARDS IN PERU DURING THE 19TH CENTURY*

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ABSTRACT

Based on a variety of archival sources, this paper presents estimations for cost of living and living standards for Lima, Peru during the 19th century. During this century Peru experienced deep swings in economic activity marked by the independence wars, the War of the Pacific, and a commodity boom. These new series show that a sizable inflationary period during the guano age had dampening effects on the living standards of the popular class. While living standards peaked by mid 1850s, GDP per capita did not do so until two decades later. These results suggest that the guano bonanza failed to lift working-class living standards above subsistence levels. Even though living standards climbed steadily, almost reaching those of England, all these gains were lost by the end of the century.

Keywords: living standards, cost of living, economic growth

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RESUMEN

Basado en diversas fuentes primarias, este artículo presenta estimaciones de costo de vida y estándares de vida para Lima, Perú durante el siglo XIX. Durante esta centuria este país sufrió profundos vaivenes en la actividad económica debido a las guerras de la independencia, la guerra del Pacífico y a un auge monoexportador. Estas series delinean un importante proceso inflacionario durante la era del guano que tuvo efectos adversos en los estándares de vida de la clase popular. Mientras que los estándares de vida llegaron a su punto máximo en los mediados de la década de los 50, el PIB per cápita lo hizo dos décadas más tarde. Estos resultados sugieren que la bonanza del guano no logró mejorar el bienestar económico de la clase popular de manera sustentable. A pesar de alcanzar niveles cercanos al inglés, estos beneficios se evaporaron al fin de siglo.

Palabras clave: niveles de vida, coste de la vida, crecimiento económico

1. INTRODUCTION

The importance of Peru in the Spanish empire is undeniable. As a key source of silver, mercury, and indigenous labour, these lands became a pillar of Spanish colonial dominion. The exploitation of silver played a significant role in shaping the economic and social structure of this colony. In addition, Spain established a highly restricted colonial trade system and Peru had one of the few ports authorised to trade with the motherland. Given this prominent role in the empire, the conservative elites, deeply entrenched in this colonial structure, became a resilient stronghold against independence from Spain. It is not surprising then that independence was a costly and difficult enterprise in this territory as part of the elite was in line with the Crown to protect its economic interests.

Despite the severance of colonial ties in the early 19th century, silver remained Peru's economic cornerstone (after a decline during the wars of independence) following a new nationalistic turn. A couple of decades later, Peru became the main worldwide supplier of the famous bird dung fertilizer: guano. The impact of the exploitation of guano on the Peruvian economy was impressive. It became the main export commodity reaching 74 per cent of total exports in 1853, while also becoming the main source of public revenue. GDP per capita climbed from a mere $400 Geary-Khamis 1990 dollars on the eve of independence to $1,124 by 1876. This remarkable economic growth experience put Peru just 15 per cent behind Argentina's GDP per capita level during the same period. The exhaustion of the guano model and the vicissitudes of the War of the Pacific erased the growth

achieved. Almost two decades after the war, the Peruvian economy regained some ground starting the new century with a GDP per capita of $674.[1]

During the 19th century Peru was trapped between two different commodity-based strategies: colonial silver and postcolonial guano. While the guano boom has attracted much attention in literature, the study of the 19th century as a whole has drawn fewer contributors. Moreover, while many facets of the guano bonanza have been explored, its impacts on welfare and cost of living have received little attention. Overall, the literature agrees that the guano boom did not translate into sustainable development for the country (Hunt 1973; Bonilla 1974; Tantaleán Arbulú 1983; Gootenberg 1993). Instead, Peru mishandled this opportunity and boom rapidly became bust.

In this paper, I bridge the gap in the literature by looking at the evolution of cost of living and living standards during the entire 19th century.[2] By using primary sources from an array of Peruvian archives, I construct cost of living and welfare series for Lima from 1820 through 1900. To assess the evolution of the cost of living, I continue the work published by Gootenberg (1990) for the rest of the 19th century using similar sources.[3] I estimate the cost of the subsistence (bare-bones) basket for a household using comparable methodology to the pioneer work by Allen (2001). In addition, I calculate a price index with the basket structure developed by Gootenberg (1990). Using wages for unskilled labour in public records, I calculate the welfare ratio defined as the number of «bare-bones» baskets that an unskilled labourer's household could afford in a year. This indicator then enables comparison with other cities and countries for the same period.

From these new series we learn that Lima underwent a striking swing in cost of living and living standards during the 19th century. There was an initial period of deflation following the wars of independence, followed by inflation during the guano boom. Prices more than doubled between the 1840s and the early 1870s while they remained stable after the deflation experienced during the War of the Pacific. This dramatic fluctuation of prices had detrimental effects on the living standards of the popular class. Nominal wages failed to catch up with the rise in prices, resulting in an overall drop in living standards before the guano boom was over. This result suggests that the gains from this growth episode were not widespread. In fact GDP per capita peaked in 1876, two decades after the welfare ratio reached its maximum. This divergence indicates that the income from the guano boom in the later stage most likely benefitted the upper segment of the population.

[1] GDP per capita data are taken from Seminario de Marzi (2011).

[2] Unfortunately, all the data correspond to the city of Lima. Given the size and heterogeneity of the Peruvian market, it is not possible to ascertain the cost of living and living standards for other regions.

[3] His price index and price series spanned from 1800 to 1873.

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These results are in line with the anthropometric evidence presented by Twrdek and Manzel (2010). In this study the authors find that from 1820 to 1880 statures of the lower class did not improve.

The study of the cost of living and living standards in this paper starts with the historical background of Peru during the 19th century followed by a discussion of the sources and methodology with the presentation of the cost of living series using the «bare-bones» basket and another series similar to that of Gootenberg (1990). These series are compared with the index estimated by this author. Using the subsistence basket and nominal wage data, I present the series on living standards measured by the welfare ratio. The following section discusses Peru's living standards in historical and comparative perspectives and the final section offers concluding remarks.

2. PERU IN THE 19TH CENTURY: THE ECONOMIC CONTEXT

The economic history of Peru during the 19th century is marked by notable political and economic shocks. From wars to the guano boom, this country travelled a winding road after colonial rule. To facilitate discussion of the historical trends in Peru during the 19th century, a simple periodisation was chosen. The first stage, from the 1820s to the 1840s, is characterized by the wars of independence and the legacies of and changes to colonial rule. The second stage, from the 1850s to the 1870s, is a period of modernisation and commodity boom. Finally, the third stage encompasses the rest of the 19th century, a phase distinguished by the War of the Pacific, crisis, and their aftermath.[4]

2.1. Stage I: Colonial Legacies, Wars and Change (1820s-1840s)

Independence from Spain arrived late in Peru when compared with the rest of South America. Peru was also different as external revolutionary forces played a major role in the process. As a result, some influential sectors remained sympathetic to the colonial power given their vested interests in the colonial productive structure (Quiroz 1993). Immediately after independence, the state continued to use the colonial institutions already in place. For example, the main sources of fiscal revenue, the tribute on the indigenous population and the proceedings from silver mining, accounted for two-thirds of total revenues (Dancuart 1905). Despite this inertia, the new government's needs for funds led to an increase in tariffs. This protectionist

[4] I am aware that periodizations can mask other relevant changes and continuities in historical processes; however, they can help illuminate key trends. Tantaleán Arbulú (2001) suggests a similar periodization: (1) the period of militarizing *caudillismo* (1821-1840), the guano era (1840-1879), (2) the period of the War of the Pacific and (3) national reconstruction and early industrialization.

turn was mostly geared towards specific sectors such as the textile industry.[5] Despite the initial sizable protectionist move, the government decreased the rates as customs revenue was increasingly important, reaching 52 per cent of total government revenue in 1831 (Tantaleán Arbulú 1983).

In terms of production, silver remained the main export representing over 50 per cent of total exports until it was displaced by guano.[6] Overall production plummeted in the 1820s as a result of the unstable economic and political situation but it regained dynamism a few years later. By the 1840s, production recovered to early 19th-century levels (Gootenberg 1990; Quiroz 1993). The wars of independence gravely disrupted the functioning of the sugar and import sectors. Sugar production decreased substantially as slaves were first recruited for armies and the conflict made transportation difficult.

Overall, the instability of the independence times had a negative impact on GDP growth. During the first quarter of the 19th century, GDP fell by over 30 per cent. The greatest drop took place during the 1820s when the annualised growth rate was −2.3 per cent (see Table 1). It was only in 1840 that Peru reached the pre-war GDP level. This severe decline in economic activity was accompanied by a significant deflation; the price level only stabilized in the late 1840s.

2.2. Stage II: Modernisation as the Result of a Boom (1850s-1870s)

The modernisation of the Peruvian economy came along with the guano boom. Tantaleán Arbulú (2001, p. 405) claims that this fertilizer caused a «true revolution […] that created the objective conditions for growth and modernization». Guano export dependency reached a peak in 1853 with 74 per cent of total exports, declining to 56 per cent and 40 per cent for the following two decades (Hunt 2011). This boom had profound effects on the Peruvian economy ranging from a hefty increase in fiscal revenue to the expansion of the domestic market.[7] Economic activity surged during these first decades as annual GDP growth averaged 4.7 per cent in the 1850s. GDP per capita peaked in 1876 at $1,123 Geary-Khamis 1990 dollars, 90 per cent

[5] Tariff rates were not stable during this period. For example the tariff rate for clothing started at 49 per cent in 1821, rose to 80 per cent in 1826 and dropped to 30 per cent in 1836 (Tantaleán Arbulú 2001).

[6] Accurate figures for silver exports are scarce as they are often conflated with silver currency. For the most comprehensive study on exports see Hunt (1973). For the 1840s, Hunt (1973) provides the quantity of silver exported and Deustua (1986) publishes export prices. Total exports are from Contreras (2004). Deustua (2000) looks at mining in 19th-century Peru.

[7] The literature on the effects of the exploitation of a new natural resource is plentiful. In the case of guano, some authors claim that the economy was characterized as an enclave as this industry did not develop any significant forward and backward linkages (see Bonilla (1974), for example). Others challenge this view looking at the significant effects of the development of the guano industry on the economy (see Hunt 1984, 1996). A careful consideration of all these claims is beyond the scope of this article.

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TABLE 1
GROWTH AND EXPORTS, 1820S-1840S

	1820s	1830s	1840s
Economic activity			
GDP growth (%)	−2.3	3.1	3.9
Annualized growth rate			
Agriculture (%)	64.4	63.1	57.4
As % of GDP			
Export dynamism			
Growth	n.a.	15.9	30.9
Average, quantum (1900 = 100)			

Sources: GDP and agriculture: Seminario de Marzi (2011), export growth and silver share: Hunt (1973).

higher than in 1850. Mining, manufacturing and retail sectors increased their overall participation in GDP while agriculture was the clear loser (based on Seminario de Marzi 2011).

From a fiscal perspective, guano exports boosted the public coffers, tripling the funds available in the 1850s. It also displaced other forms of taxation contributing up to 83 per cent of total revenue in 1857 and 1869 while averaging over 55 per cent during this period (see Table 2).[8] This sudden influx of resources financed the growth of the government, from 1848 to 1878 over 50 per cent of the guano proceedings paid for the expansion of the civil and military bureaucracy (Hunt 1984).[9]

The expansionary fiscal policy had effects on the size of the domestic market. A new cadre of public employees broadened the domestic market (Contreras 2004). In addition, 20 per cent of guano funds were devoted to railroad construction. This project intended to diminish transportation costs and provide the country with a transport infrastructure. Unfortunately, the project was plagued with difficulties and was not completed until after the War of the Pacific.

2.3. Stage III: Recovering from the Boom and the War (1880s-1890s)

The war with Chile, known as the War of the Pacific, and the exhaustion of the guano-led growth model marked a new stage in Peruvian history.

[8] Other fiscal-related developments include a sizable increase in public debt; see for example Gootenberg (1989) and Vizcarra (2009).

[9] According to Hunt (1984), the rest of the guano funds went to railroads (20 per cent), transfers to Peruvians (11.5 per cent), transfers to foreigners (8 per cent) and reduction of fiscal burden (7 per cent). The civil bureaucracy category also includes non-military public works.

TABLE 2
GROWTH, EXPORTS, FISCAL ACCOUNTS, 1820S-1870S

	1850s	1860s	1870s
Economic activity			
GDP growth (%)	4.7	2.1	−1.6
Annualized growth rate			
Agriculture (%)	46.6	43.8	41.7
As % of GDP			
Export dynamism			
Growth	64.0	83.5	121.2
Average, quantum (1900 = 100)			
Share			
As % of GDP			
Fiscal accounts			
Revenue from guano (%)	60.6	59.9	55.4
Share of total revenue, per decade			
Revenue growth (%)	227.3	127.8	142.3
Decade growth in real terms			

Sources: GDP and agriculture: Seminario de Marzi (2011), export growth: Hunt (1973); fiscal accounts: Tantaleán Arbulú (2001).

By the early 1870s guano reserves were severely depleted. Moreover the development of an artificial fertilizer was quickly eroding the leading position guano had enjoyed in the past. Faced with dire fiscal circumstances, the government turned to the nitrates sector to solve its problems.[10] In 1873, it levied an export tax on nitrates but the largest producers failed to comply with the new requirements. The government responded by expropriating 161 nitrates companies. The armed conflict emerged when the Bolivian government increased export taxes on nitrates, a move which violated a treaty between Bolivia and Chile. Given the importance of nitrates in the Peruvian economy and the secret alliance between Peru and Bolivia, Peru was drawn to war.

The results were devastating for the Peruvian economy. Economic activity plummeted as total GDP dropped by more than 30 per cent from 1879 to 1883 (see Table 3).[11] Peru also lost the nitrate-rich province of

[10] For a full account of the Peruvian fiscal crisis during this period in historical perspective see Contreras (2012).

[11] The drop in GDP per capita according to Maddison's (2007) figures was 26 per cent for the same period.

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TABLE 3
GROWTH AND EXPORTS, 1880S-1890S

	1880s	1890s
Economic activity		
GDP growth (%)	−1.8	3.9
Annualized growth rate		
Agriculture (%)	64.0	63.7
As % of GDP		
Export dynamism		
Growth	42.6	65.0
Average, quantum (1900 = 100)		

Sources: GDP and agriculture: Seminario de Marzi (2011), export growth: Hunt (1973).

Tarapacá while Bolivia lost access to the Pacific Ocean. From a fiscal perspective, the state was bankrupt. Fiscal revenue nosedived from 35 million soles in 1879 to around one million in 1883 (Klarén 2005). The export sector ceased to be the revenue generator as exports of guano and nitrates vanished. In 1887, exports were a mere 23 per cent of the pre-war level (Yepes 1992).

The recovery only got underway after the external debt problem had been solved. GDP growth reached 1.7 per cent per year during the 1890s despite the turbulence caused by the Barings crisis. By the second half of this decade, exports regained dynamism fuelled by exchange depreciation and investment (Thorp and Bertram 1978). In particular, the manufacturing sector was expanding rapidly with annual growth rates reaching 18 per cent in 1896.

3. COST OF LIVING WAGES AND WELFARE IN 19TH-CENTURY PERU

Research on prices and wages in Latin America followed the footsteps of historians such as Hamilton. Romano (1963) and Florescano (1968) produced pioneering works on Latin American prices, followed by Johnson and Tandeter (1990); however, the scope and coverage varied substantially by country. While many of these studies correspond to colonial times, in recent decades few have emerged for the 19th century. For example, Williamson (1999) computed real wages for several countries in the region with some coverage of the 19th century. On a country basis, the coverage is thin for most of the region. In the case of Mexico, Gómez-Galvarriato and Musacchio (2000) created a cost of living index for the late 19th century. For Venezuela, Arroyo Abad (2013) looked at the cost of living and living standards for the

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19th century. Relatively speaking, more studies are available for the southern cone. Cuesta (2007, 2012) studied 18th-century prices and the evolution of real wages in Buenos Aires for the period 1850-1913. Bértola (2000) and Braun *et al*. (2000) present a cost of living index for Uruguay and Chile respectively. For Peru, Macera (1992) assembled the most impressive collection of retail prices for different urban and rural locales during colonial times. Gootenberg (1990) looked at the cost of living in Lima for most of the 19th century.

To estimate cost of living and living standards it is necessary to collect retail prices and wages. Most of the studies quoted above supplied either data and/or analysis on prices and their trends. However, data on wages are scarcer in general, and even more so in the case of the 19th century. The disarticulation of the colonial system brought about tangible consequences for the political, social and economic structure of the Spanish colonial possessions, including data collection and record keeping. As a result, compilation of such data is difficult and slow, especially when compared to the research available for colonial times. Despite the challenge, we observe some progress for some countries. In the case of Peru, the pioneering study by Hunt (1980) was supplemented by Zegarra (2011) on wages and poverty for the early 20th century.

The quest to discover and understand the historical evolution of cost of living and living standards around the world has been quite fruitful lately. A new wave of studies has looked at different areas in the world for long periods of time inspired by the seminal work for Europe by Allen (2001). As a result of this work, new studies used similar consumption baskets to compare living standards around the world. Using comparable methodologies, Özmucur and Pamuk (2002) worked on the Ottoman Empire. India was tackled by Allen (2007) followed by Allen *et al*. (2011) for selected countries in Asia. More recently, Cvrcek (2013) looked into the Habsburg Empire during the 19th century. For Latin America, Arroyo Abad *et al*. (2012) studied the long-term trends for a sample of locations during colonial times. However, there is a gap in the literature for the 19th century with the exception of Venezuela. Arroyo Abad (2013) has calculated both cost of living and living standards for the 19th century.

Exploiting the data already available for 19th-century Peru and supplementing them with my own archival work, this paper uses the methodology devised by Allen (2001) and expanded by Arroyo Abad *et al*. (2012). As detailed below, the methodology also includes other consumption baskets available from other sources.

3.1. Prices and Price Indices

Prices correspond to retail transactions in the city of Lima. Gootenberg (1990) published retail prices for over twenty products from 1825 through 1873.

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Following his footsteps, I completed the series by collecting data for the rest of the late 19th century from similar sources.[12] The price data were taken from the Archivo del Arzobispo de Lima. The records correspond to churches and monasteries such as Trinitarias and Santa Clara.[13] Compared with modern-day price data, these sources present limitations. In the first place these ecclesiastical institutions were private and, as such, followed private accounting practices. It is often impossible to control for quality and at times the prices obtained included a discount «in the name of god».[14] Despite these limitations, the consensus is that this type of source is the best available for retail prices as they cover long periods of time and the prices are market based (Cuesta *et al*. 2011). The frequency was mostly monthly transactions. Not all prices were available for all years. If the gap was small, the intervening observation was interpolated. Prices were quoted in soles, pesos and reales. We used the conversion of 1 sol equalled 10 reales (Gootenberg 1990) and prices were converted to the metric system. Unfortunately, no data were available for the period 1875-1880. Following Gootenberg's methodology, I estimated the price of textiles with U.S. wholesale cotton sheeting prices compiled by Hanes (2006).[15]

With the available prices it is possible to trace the general evolution of prices over time; however, to estimate the cost of living it is necessary to use a representative consumption basket. In this study, two types of baskets are considered: a subsistence basket and a more comprehensive basket. For both cases, I use a fixed weight index taking into consideration the consumption baskets described below. The first basket offers the bare minimum necessities for subsistence. Also known in the literature as the «bare-bones» basket, it comprises a few goods under the category «foodstuffs» and other consumption goods such as sundry items for clothing, heating and lighting. The basket presented in Table 1 is comparable with the ones conceived by Allen (2001) and Allen *et al*. (2011). The rationale behind the subsistence basket is to create a consumption basket that reflects the «price of subsistence» as introduced by Adam Smith in *The Wealth of Nations*. As cited in Allen *et al*. (2011, p. 1), Smith (1776) noted that the nominal wages paid in Europe were higher than in China not only as a result of differences in cost of living, in Smith's words the «price of subsistence», but also because the return on labour was higher in Europe.

[12] The coverage varied by good and by year. Excluding the War of the Pacific years, the coverage ranged from 50 per cent to 85 per cent of the total years studied.

[13] Archivo del Arzobispado de Lima, Trinitarias, 1883-1898 (Legajo IV, números 70, 111, 117-8, 126); Encarnación, 1873 (Legajo XXIX, número 47); Santa Clara, 1882-3 (Legajo XXXIV, números 14, 32, 111, 121); de la Trinidad, 1876-1900 (Archivo Intermedio, números 29m 32, 34, 72, 76, 77, 82, 86, 90, 95).

[14] For a discussion of the reliability of this type of sources see Romano (1992) and Johnson (1992).

[15] Contreras and Cueto (2004) also note that with independence the *obrajes* succumbed to foreign competition. For the popular classes, the United States was the main supplier of textiles.

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To construct such a basket, I consulted an array of sources ranging from Gootenberg's (1990) original basket to 19th-century primary sources.[16] In general, the popular class had a nutritious diet as beef and bread were plentiful. In fact, the consumption basket was not very different (in terms of the type of goods consumed) from the food consumption basket of the upper classes (Peloso 1985). From them, I devised a simple basket based on the consumption patterns of the popular class in the city of Lima. I followed the methodology developed by Allen *et al*. which considers the cost of living in different locations in the world. For England, Allen (2001) created a basket that was too expensive for the developing regions in the world. As a result, the basket was simplified by including only a handful of products and provides the bare minimum nutrition needs for an adult taking into account the diet preferences of the inhabitants of Lima, the *limeños*.

Table 4 shows the composition of this bare-bones basket in comparison with similar baskets for other locations in the world. For Lima, the basket considers a diet of 1,928 calories where beef and beans are the main protein sources. This caloric intake is similar to other subsistence baskets in other cities in history. Meats, bread, rice, beans and butter are the only food items considered.[17] From Moreno (1897) it is possible to estimate the average consumption of meat based on the number of cattle slaughtered in the city of Lima: 98.2 kg of meat consumption per year.[18] The other goods included in the basket include miscellaneous items such as textiles for clothing, firewood and candles for heating/lighting, and soap. All these items constituted 95 per cent of the total budget, reserving the rest for housing costs and miscellaneous items. As the basket provides yearly quantities consumed of each product, it is possible to calculate its monetary cost in local currency. To estimate the cost of living of a family of two adults and two children, the individual «bare-bones» basket is multiplied by three.[19] The two minors are assumed to consume the equivalent of one adult's basket. This methodology allows for international welfare comparison when combined with data on wages.[20]

[16] See Datos e informes (1870), Moreno (1897), Peloso (1985) and Ruiz Zevallos (2001).

[17] For beans, I considered chickpeas and regular beans. While traditionally associated with the typical Peruvian diet, potatoes do not appear in the consumption baskets by Gootenberg (1990) and in all but one of the baskets presented in Datos e informes (1870). Lard was substituted by butter due to data constraints; the records at the Archivo del Arzobispo de Lima only offered the price of butter for the late 19th century. In Datos e informes (1870) many of the consumption baskets quote butter as the main source of fat.

[18] Other estimates are available; however, we used the most modest figure. The annual per capita consumption of beef is 167, 125, and 104 kg, for Gootenberg (1990), Ruiz Zevallos (2001) and Datos e informes (1870), respectively.

[19] In the studies on Bolivia and Peru in Johnson and Tandeter (1990) the size of the household was two adults and two children.

[20] For earlier periods, it would be possible to compare the cost of the basket in silver grams. Given the post-independence monetary disarray, I have chosen not to include such a comparison.

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TABLE 4
SUBSISTENCE CONSUMPTION BASKET IN COMPARATIVE PERSPECTIVE

	Basket composition per year				
	Unit	**Lima (19th century)**	**Cuzco (colonial)**	**Northern Europe**	**Beijing**
Foodstuff					
Meats	kg	98.2	35.0	5.0	3.0
Bread	kg	49.1			
Oats	kg			155.0	
Rice	kg	58.9			171.0
Dried beans	kg	49.1	45.0		20.0
Lard	kg				
Butter	kg	11.8		3.0	
Oil	kg				3.0
Potatoes	kg				
Corn	kg		165.0		
Other					
Cotton	M	3.0	3.0	3.0	3.0
Fuel	M BTU	3.0	3.0	3.0	3.0
Candles	kg	1.3	1.3	1.3	1.3
Soap	kg	1.3	1.3	1.3	1.3
Total daily calories		1,927	1,938	1,938	1,939
Total daily protein (g)		107	89	89	63

Notes: kg: kilogram, M: meter, M BTU: million BTU.

Sources: Lima (19th century): for food quantities, the estimations are based on *Datos e Informes* (1870), pp. 111-119, Moreno (1897), pp. 171-174, Peloso (1985), pp. 52-58 and Ruiz Zevallos (2001), p. 41, the rest of goods are from Allen (2001) and Arroyo Abad *et al*. (2012); Cuzco (colonial): Arroyo Abad *et al*. (2012), Northern Europe and Beijing: Allen (2001) and Allen *et al*. (2011).

From all the sources it is clear that the *limeños* had a strong preference for meat. This is particularly striking when compared with the baskets for Beijing and Northern Europe. Except for slave diets until the 1850s, all the baskets cited in Datos e informes (1870) contain meat, in particular beef, as a sizable component of the everyday popular diet. Moreover, Lima had higher per-capita beef consumption than London (Datos e informes 1870, pp. 130-131, Peloso 1985, p. 50). According to Macera (1974), Lima overtook London in terms of beef consumption by the mid 19th century. In a periodical publication by the Lima Geographical Society, beef consumption figures prominently in a comparison with other major cities in 1897. According to this source, Lima's

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TABLE 5
TRADITIONAL CONSUMPTION BASKET

	Original (%)	Adjusted (%)
Meat	34.3	34.7
Bread	21.0	21.2
Rice	8.0	8.1
Beans	8.0	8.1
Sugar	5.1	5.2
Lard	4.9	5.0
Noodles	1.8	1.8
Fuel	10.8	10.9
Other items	6.1	5.0
Total	100.0	100.0

Source: Based on Gootenberg (1990), p. 14.

beef consumption per capita was 98.2 kg, followed by the United States and the United Kingdom with 54.5 and 47.7 kg, respectively (Sociedad Geográfica De Lima, 1897). It appears that 19th-century observers, to some extent, criticised the *limeño* taste for beef.

In addition to this «bare-bones» basket, I computed a «traditional» basket following Gootenberg's (1990) estimations (see Table 5). Unlike the previous basket, this one states a relative share of consumption components. This basket includes a larger set of consumption items, in particular in terms of foodstuffs. The author used the artisan diet to build this basket and amended it based on the food budget of the Santa Ana hospital. Both sources are for the 19th century, the Santa Ana records correspond to 1837 while the artisan diet is for the year 1869. Given that the exact composition of the «Others» category is not explicit, I have recalculated the weights by reducing it to 5 per cent for miscellaneous items and housing. As a result the different components increase their share relative to the original budget as shown in the «Adjusted» column in Table 2. By looking at the weights, it is clear that the bulk of the budget was devoted to meat and bread, which accounted for almost 60 per cent of the total budget. Other foods such as rice, beans, sugar, lard and noodles represented <30 per cent of the consumption basket.

In Figure 1, I present the three indices for easy comparison: Gootenberg's original index, the subsistence consumer index, and the recalculated original index (the traditional index). The three indices follow similar trends, not surprisingly the correlation coefficients between the two estimated series and Gootenberg's original index are high, 0.9 and 0.94, respectively. From these

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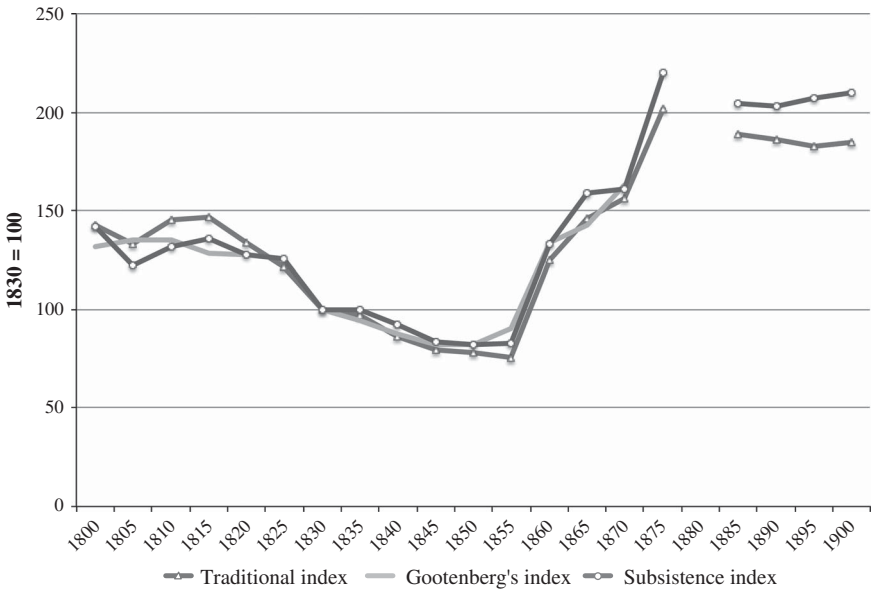
FIGURE 1
COST OF LIVING, CONSUMER PRICE INDICES



Sources: For the subsistence and traditional indices, see text; Gootenberg's index: Gootenberg (1990).

series, it is clear that the overall cost of living decreased in the mid 19th century to rise considerably until the 1880s. From the mid 1870s onwards, the data now available correspond to the series estimated in this paper. For the rest of the century, the cost of living in Lima fell slightly, remaining at significantly higher levels with respect to the mid-century values. In sum, deflation was prevalent after the wars of independence followed by a sharp generalised increase in prices from the 1850s and the century ended with moderate deflation. Overall, the price level more than doubled in this century. These results are robust to different 19th-century consumption baskets; the overall cyclical trend is reproduced when varying the sources of protein and carbohydrates.[21]

The downward trend until mid-century is driven mostly by the evolution of the prices of bread and butter. From this point onwards, inflation accelerated, especially in the 1855-1870 period. The increase in prices was such that the government appointed a commission to analyse the evolution of prices

[21] Assessing the overall cost of living is highly sensitive to the consumption basket of choice. In Appendix B, four additional consumption baskets are presented with their corresponding cost of living series.

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during this period (see Datos e informes 1870). This committee commented on the disparity between the actual consumption pattern observed and the potential nutritional substitutions available to the general public. The reality, according to this report, was that the popular class was making careless consumption decisions. Given the rise in the price of beef relative to the price of fish, consumption should have shifted towards the latter, especially taking nutritional content into account (Datos e informes 1870, pp. 100-105).[22] According to the medical knowledge of the time, the commission claimed that through cheaper choices, a «man could make a pound of beef with his own body» (Datos e informes 1870, p. 82). While no estimates are available for the War of the Pacific period, different sources indicate a dramatic increase in prices and generalised food scarcity (see, e.g. Peloso 1985). Towards the end of the century, prices stabilized albeit at a higher level relative to the preceding decades.

3.2. Wages

To evaluate living standards, it is necessary to look at the evolution of nominal wages in Lima during this period. The existing literature is scarce in this area, as different sources provide patchy data on wage levels. Following the existing literature on living standards by Allen *et al.*, I use wage data for unskilled occupations. To be precise, these data are for occupations that require little to no skills such as watchmen, guards, doormen and servants. The sources of these data are similar to those used for prices. In particular, I have collected data from governmental branches such as the Department of Treasury, lower courts, the Department of State, and the Military Hospital.[23] In addition, I also consulted records of religious private institutions such as Santa Clara and Trinitarias. The data are from accounting records that list the occupations and the respective salaries. In many cases, these salaries are monthly. In the ecclesiastical records, a few of the records listed daily labourers.[24] To convert the series into annual earnings, I multiplied the monthly payment by a factor

[22] The committee makes many suggestions regarding food substitutions based on nutritional content. The two components analysed in terms of nutritional value are carbon and nitrogen content. For example, the consumption of the *chayuyo*, a type of marine algae, is highly recommended.

[23] Archivo General de la Nación: OL 25 (Legajos 1-29), 35 (Legajo 3), 40 (Legajos 99-100), 71 (Legajos 42a, 383, 392), 104 (Legajo 18), 100 (Legajo 60), 152 (Legajos 1062. 1062a, 1071-1073, 1077-8), 120 (Legajos 309, 325-331), 199 (Legajos 3867-4053, 4638-4674), 280 (Legajos 1996-2087), 320 (Legajos 1267-1725), 359 (Legajos 497a, 497b, 498-637), 393 (Legajos 1145-1159), 431 (Legajos 1314-1419), 432 (Legajos 1059-1084), 394 (1143-1159), 468 (Legajos 1-24, 35, 36), 472 (361-373, 382-388), 502 (Legajos 638-647); RJ (Legajos 172, 259, 260), H-4 2152 (Legajo R.592), 2385, 2482, 2488, 2507, 2518, 3350, 4588.
Archivo Histórico Militar: números 267, 432, 446, 450, 535, 572, 597, 668, 716, 720, 722, 749, 816.
Arzobispado de Lima: see footnote number 3.

[24] The records did not include child workers. In a few cases I found data on female workers for traditional occupations such as nurse, cook and laundress.

of 12 and in the case of a daily wage, the assumption was 250-280 days per year (Brown 1990, Johnson 1990).[25] The series are, unfortunately, not continuous. I was only able to obtain data every five years with an important gap during the War of the Pacific.[26]

Given the data limitations, it is key to confirm their validity.[27] Based on the labour force composition offered by Hunt (1980), the data sources are representative of the Lima labour market: the government and the service sector employed almost 40 per cent of the labour force in 1876.[28] Unfortunately, data on wages for the 19th century are scarce; however, comparing with other available sources shows similar prevailing wage rates.[29] Ruiz Zevallos (2001) reports an average salary of 1.5 soles per day for a peon at a manufacturing firm for 1900. Contreras (2004) and Giesecke (1978) find that the unskilled wage rate was slightly less than one sol per day in 1866. In annual terms, the average of these data points is within a 10 per cent range in line with the nominal series presented here.

3.3. Welfare Ratio

With the nominal wages and the «bare-bones» basket for a family of four, it is feasible to estimate living standards by dividing the wage by the basket. This ratio is known in the literature as the «welfare ratio». A ratio of one implies that the income is just enough for a family to subsist. Consequently, an index higher than one suggests that the family could afford other goods beyond the subsistence basket.

Figure 2 shows the evolution of this ratio from 1820. The data exhibit an inverted-U pattern: there is an increase in welfare from 1820 until mid-century and a decline thereafter. The ratio increases from <1.5 in 1820 to reach a maximum of almost 2.5 ca. 1850. Towards the end of the century, the ratio stabilizes around 10 per cent above subsistence level. The lower welfare ratio from mid-century onwards is the compounded result of ever-increasing prices with a nominal salary that failed to catch up with the cost of living. In the 1860s, the dissatisfaction was palpable in the city where the workers often complained about constant price increases affecting staples in their diets (Datos e informes 1870; Peloso 1985).

[25] Allen (2001) uses 250 days per year. The data collected reflected mostly monthly payments.

[26] According to the archivists at the Archivo de la Nación, the records during this time were lost, presumed burned by the Chileans during the occupation of Lima.

[27] The wage data have limitations; for example, they do not take into account goods produced in the household. Contreras (2004) addresses this issue by claiming that pricing home production in Peru is very difficult and to some extent pointless; however, he estimates that it could amount to $100 per household per year.

[28] The labour force represented 48.8 per cent of the total population (Hunt 1980).

[29] Hunt (1980) published data only on the 20th century. Datos e informes (1870) provides data on slave wages in 1854 and rural peons in 1869.

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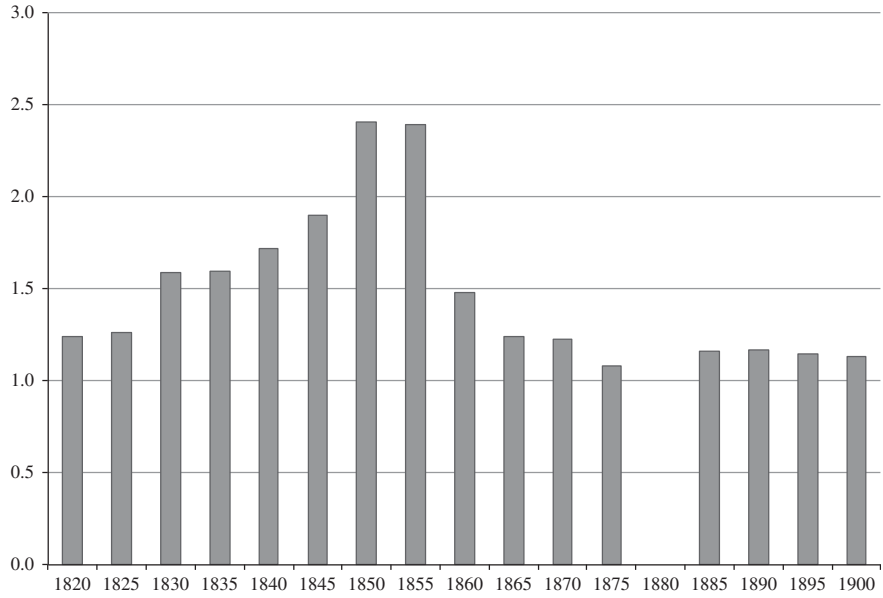
FIGURE 2
WELFARE RATIO, 1820S-1900S



Source: see text.

4. COST OF LIVING AND LIVING STANDARDS IN HISTORICAL AND INTERNATIONAL PERSPECTIVES

During the 19th century, the Peruvian economy, after the instability during the wars of independence, experienced a sustained growth spur thanks to the guano boom. In terms of living standards, the early years of independence saw an erosion of welfare as the welfare ratio was only 25 per cent higher than the subsistence level. Living standards improved in the following decades, driven largely by the continuous deflation experienced in this period.[30] The exploitation of guano had a profound impact on the economy, contributing to a sizable increase in Lima's cost of living (Giesecke 1978; Gootenberg 1990, 1993; Ponce Vega 1993). The city also acted as a magnet to people from other locales prompting migration and further fuelling demand (Klarén 2005). The city's population grew by almost 70 per cent

[30] Despite the regained dynamism of the economy in the 1840s, prices continued to fall as measured by the bare-bones basket. Gootenberg (1990) also finds a deflationary trend of similar magnitude in the 1840s.

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TABLE 6
PRICE INDEX AND WELFARE RATIO

	1820s-1840s	1850s-1870s	1880s-1890s
Price index Average, 1830 = 100	104	148	204
Welfare ratio Average	1.5	1.6	1.2

Source: see text. The price index corresponds to the subsistence basket.

between 1836 and 1857, slowing down during the rest of the century and reaching over 100,000 in 1876 (Fuentes 1858; Dirección de Estadística 1878). Prices increased by more than 50 per cent in the 1850s and continued to rise in the following decade. The relentless rise of prices was a source of such concern that in 1870 a committee was appointed to investigate the causes of inflation. In this report, the committee concluded that prosperity was one of the main causes behind this phenomenon as manifested in population growth and the increase in the return to labour and land (Datos e informes 1870). Living standards improved significantly during the 1850s as the welfare ratio rose to 2.4 and then steadily declined in the following decades due to the rapid rise in prices (see Table 6).

The deterioration of living standards induced social discontent culminating in riots and uprisings in the city in 1858 and 1872. In the case of the latter episode, the roots of the popular discontent can be traced to expansionary monetary and fiscal policies together with a surge in imports, which translated into a rise in the cost of living. The prices of the main products in the popular consumption basket more than doubled in many cases (Giesecke 1978; Gootenberg 1990; Klarén 2005). According to Giesecke (1978, p. 114), «the socio-economic situation of the poorest was very hard and generated a high degree of discontent […]. The social situation was, as a result, explosive».

The aftermath of the economic crisis and the war prompted a long period of deflation in the Peruvian economy. The cost of living fell substantially but remained higher than during the pre-guano era. This was good news in terms of living standards which gained (a little) ground compared with 1875. By the turn of the 20th-century Peru had survived a sizable commodity boom and a war. In GDP per capita terms, the average inhabitant was 70 per cent richer than in early independent times but from a living standard perspective, the unskilled labourer was worse off. Using the welfare ratio, the loss was around 10 per cent compared with 1825.

The rise and fall of living standards in 19th-century Peru show the disconnection between economic growth and living standards, especially during the guano boom. So far the literature shows an inverted U-shaped

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TABLE 7
LIVING STANDARDS AROUND THE WORLD, CA. 1820S

	Year	Ratio
Amsterdam	1820	1.76
Gdansk	1812	1.06
Krakow	1820	1.03
London	1820	2.19
Madrid	1820	1.77
Milan	1820	0.61
Strasbourg	1820	1.61
Warsaw	1820	1.67
Beijing	1820	1.09
Kyoto/Tokyo	1820	0.93
India – north	1820	1.68
Bogota	1800	1.45
Buenos Aires	1827	3.39
Caracas	1830	0.34
Lima	**1820**	**1.23**
Mexico	1810	0.93
Potosi	1810	1.65

Sources: Buenos Aires, Bogota, and Mexico: Arroyo Abad *et al*. (2012); Caracas: Arroyo Abad (2013), Europe: Allen (2001); India: Allen (2011); Beijing and Tokyo: Allen (2011).

pattern for Peru during the 19th century: there was little growth in the two decades after independence, followed by rapid growth during the guano era.[31] The performance during the rest of the 19th century was marked by a sizable drop in economic growth before and after the War of the Pacific and a vigorous recovery in the 1890s. GDP per capita peaked in 1876 at $1,123 and 7 years later it was only $477 (Geary-Khamis dollars). Many authors have noticed this rollercoaster experience in Peruvian history, indicating the country's failure to launch into sustainable economic development and growth. While the GDP per capita trajectory is informative, GDP per capita per se is an imperfect indicator of economic welfare for many reasons; for example it only takes into account market activity and it is invariant with respect to quality of goods and services transacted. Most importantly

[31] With the notable exceptions of Basadre (1969) and Levin (1960); both claim that economic growth did not materialize during the guano era.

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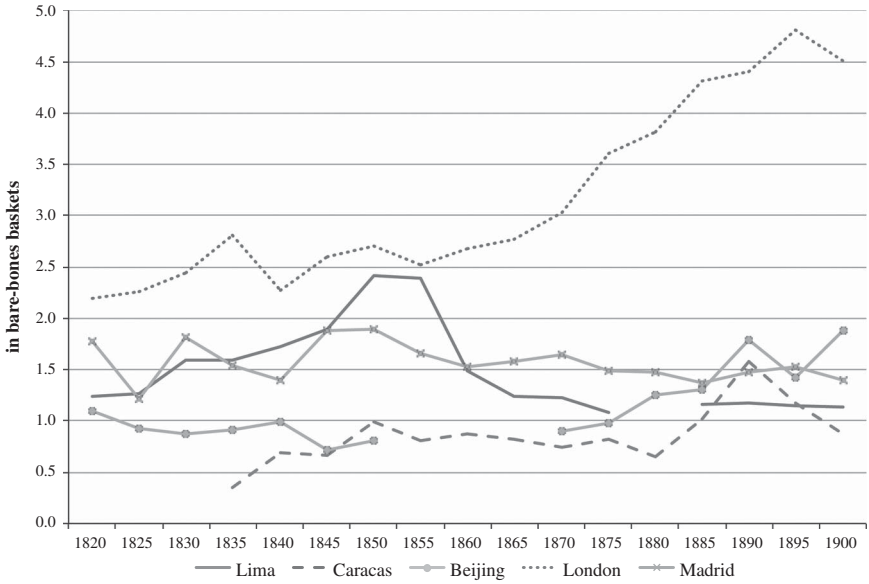
FIGURE 3
LIVING STANDARDS IN LIMA, CARACAS, BEIJING, LONDON, AND MADRID, 19TH CENTURY



Sources: Lima: see text; Caracas: Arroyo Abad (2013), Beijing: Allen *et al*. (2011), Madrid and London: Allen (2001)

for this discussion, GDP per capita provides no information about income distribution.[32]

The rags-to-riches story had a different trajectory when looking at the welfare of the popular class with a maximum of 2.4 bare-bones baskets being reached in the mid 19th century followed by a decrease for the rest of the century. The difference between the evolution of living standards and economic growth suggests that the benefits of the guano boom were even more short-lived for the popular class. Contemporaries and scholars noted the unprecedented economic polarisation during the height of the guano boom, for example Wiener (1880, p. 41) claimed that the Peruvian society was divided in two groups: «money and knowledge» at one end and «poverty and ignorance» at the other. The inflow of guano income widened the gap between rich and poor as inflation eroded real wages (Gootenberg 1989, 1993; Klarén 2005). Anthropometric evidence is consistent with these results.

[32] Many sources discuss the limitations of GDP and the GDP per capita, starting with macroeconomics textbooks. Bértola *et al*. (2011) looks at this issue for Latin America in the 20th century.

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Twrdek and Manzel (2010) found that the positive effects of the guano boom did not trickle down to the popular class.

The use of Allen's (2001) methodology allows for international comparison. Thanks to the diligent work of many economic historians, it is possible to study comparable data for an array of cities during the 19th century.[33] Table 7 offers living standard estimations ca. 1820s for seventeen cities, five of them in Latin America. Lima's welfare ratio is average for the region but lower than the European figures.

Looking at living standards from a more dynamic perspective, it is clear that the guano boom put Lima on a higher level for a decade (see Figure 3). This impressive climb brought Lima's living standards up to levels similar to those enjoyed in London. Yet, a steep fall followed as the welfare ratio plummeted to almost subsistence level, ending the century with lower living standards than Caracas.

5. CONCLUDING REMARKS

Throughout the 19th century Peru faced the challenges associated with the transition from a colonial system. After the struggle of the first independent decades, a new prosperous era followed where a single export commodity, the powerful fertilizer guano, fuelled the economy and flooded the public coffers. In the early 1870s the conjunction of dwindling reserves, new artificial fertilizers, and a war with a neighbouring nation brought an end to this era of affluence. Overall, this century was an economic growth rollercoaster in which, as many scholars have pointed out, the opportunity for sustainable growth was squandered.

This paper has looked into how the cost of living and the living standards of Lima, Peru mapped to the overall economic swings experienced during the 19th century. Using an array of archival sources, I estimate two price indices, a «bare-bones» basket following Allen's (2001) methodology and a more comprehensive one comparable to Gootenberg's (1990) budget. These new data series show a deflationary period following the wars of independence, followed by a sharp increase in prices during the guano boom. After a drop following the War of the Pacific, Peru's price level stabilized towards the end of the century. Living standards improved around mid-century; however, the inflationary process eroded these gains by the 1870s.

As GDP per capita continued climbing until the early 1870s, these results suggest that the gains from the guano boom were skewed towards the elite, especially after the 1850s. The popular classes did not fully benefit from the economic growth spurt. As scholars indicate the exhaustion of the guano

[33] See the Global Prices and Income History Group website (http://gpih.ucdavis.edu) for the data series.

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model by the early 1870s, this new research shows that the most profitable enterprise in Peru failed to lift the popular class from subsistence consumption level for long, even with an earlier inflection point. These findings are in line with the studies which highlight the weaker institutional base in this country. The advent of the guano bonanza as the main source of revenue and income for Peru at such an early stage of its nationhood buried the need to build a more diversified economic structure and search for different sources of government revenue.

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APPENDIX A: CONVERSIONS TO THE METRIC SYSTEM

Most of the prices were quoted in non-metric units. Following Descola (1962), Gootenberg (1990) and Langer and Hames (1994), the conversions used are as follows:

1 arroba = 25 lbs = 11.36 kg
1 quintal = 4 arrobas = 45.44 kg
1 fanega of maize or wheat = 61.36 kg
1 fanega of beans = 70.90 kg
1 saco of flour or chickpeas = 90.90 kg
1 saco of maize = 70 kg
1 carga = 45.44 kg
1 lb = 0.45 kg
1 cántara = 8 azumbres = 2.5 gallons
1 vara = 3 feet = 0.91 m

APPENDIX B: ROBUSTNESS CHECKS

The construction of historical cost of living indices is challenging as it requires reliable knowledge of the typical consumer basket for a given city for a given period of time. Fortunately, for 19th-century Peru there are many sources that document the consumption patterns, in particular for Lima. Even though the cost of living in this article is based on a specific basket by Peloso (1985), I believe it is important to run robustness checks in the form of alternative baskets. This exercise will allow us to ascertain the reliability of the basket chosen in terms of general patterns of cost of living. Note that the consumption baskets used are, mostly, representative of the consumption patterns of the popular class.

To be specific, the baskets chosen correspond to a low-income individual as presented by Gootenberg (1990), a prisoner as reported by Lima City Hall (Consejo Provincial de Lima 1889), and three consumption baskets from the report on inflation in Lima in 1870 corresponding to a prisoner, a slave, and an army officer (Datos e informes 1870). These estimates are compared with the indices estimated in this article, that is the subsistence and the traditional indices. Table B1 shows the composition of each basket starting with the subsistence basket introduced in this article. With the exception of

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TABLE B1
SELECTED CONSUMPTION BASKETS

	Basket composition per year						
	Unit	**Subsistence**	**Gootenberg[1]**	**Prisoner 1**	**Slave**	**Prisoner 2**	**Army officer**
Foodstuff							
Meats	kg	98.2	167.9	124.4		167.9	126.1
Bread	kg	49.1	104.8	41.5	167.9	147.2	87.6
Rice	kg	58.9	62.8	83.0		52.6	61.3
Dried beans	kg	49.1	42.0	62.2	167.9	63.1	61.3
Lard	kg		20.8				
Butter	kg	11.8		5.2			10.5
Potatoes	kg			2.1			92.0
Other							
Cotton	M	3		3	3	3	3
Fuel	M BTU	3	167.9*	3	3	3	3
Candles	kg	1.3		1.3	1.3	1.3	1.3
Soap	kg	1.3		1.3	1.3	1.3	1.3

Notes: M: meter; M BTU: million BTU.
*Kilograms.
[1]Gootenberg's basket includes other items such as sugar, milk, tea, vinegar, and salt. See Gootenberg (1990), p. 14 for details.
Sources: Subsistence, see text; Gootenberg: Gootenberg (1990), Prisoner (1): Consejo Provincial de Lima (1889); Slave: Prisoner (2), and Army officer: Datos e informes (1870).

the slave basket, all the other baskets have a much higher consumption of meat, up to 167.9 kg per year. This figure appears to be too high as the per capita consumption of meat was around 98 kg, which coincides with the figure used in the subsistence basket based on Peloso (1985). Looking at the total calories per basket, it is clear that all these baskets are well above the subsistence threshold. For example, Gootenberg's (1990) basket adds at least 3,000 calories, well above the «respectable» basket devised by Allen (2001).

The differences between these baskets provide the opportunity to evaluate the overall price level trends. Figure B1 displays the evolution of these cost of living indices over time with base 1830 = 100.[34] At first glance the trends are similar with a deflationary phase until the 1850s and an inflationary period until the 1870s. This fact is corroborated with the corresponding correlation

[34] Note that the consumption basket for a slave was calculated after 1854, when slavery was abolished in Peru, for illustration purposes.

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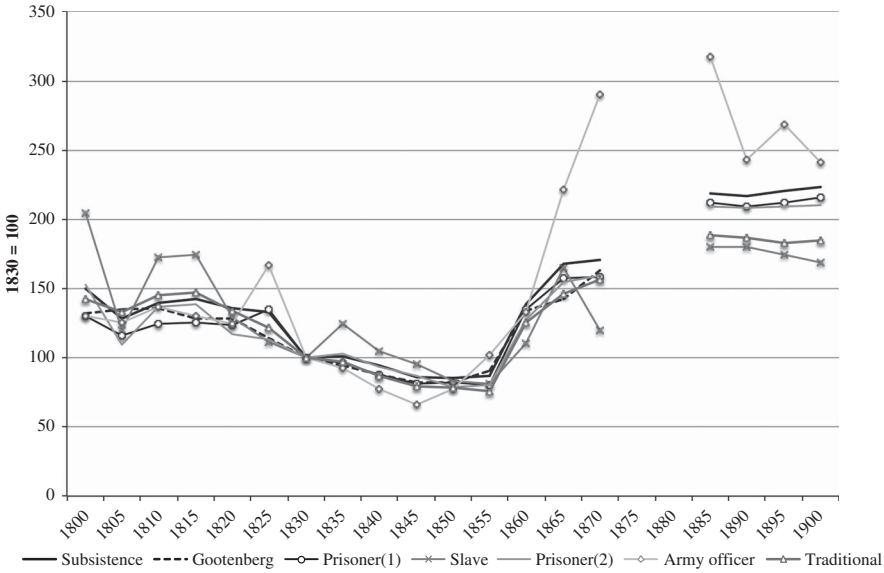
FIGURE B1
COST OF LIVING INDICES, 1830 = 100



Sources: see Table B1.

coefficients, ranging from 0.74 to 0.99. The cost of living of army officers appears as the most dissimilar of the sample as the series overshoots before the War of the Pacific. This movement is fully explained by the sharp increase in the price of potatoes due to a widespread disease affecting this crop during the late 1860s and early 1870s.

APPENDIX C: DATA SERIES

	Cost of living			Living standards
	Subsistence index (1830 = 100)	**Traditional index**	**Gootenberg's index**	**Welfare index (1 = subsistence)**
1800	141.8	142.8	131.8	
1805	122.6	133.0	135.2	
1810	132.2	145.3	135.4	
1815	135.0	146.9	128.7	
1820	128.9	134.1	127.9	1.2
1821	129.9			

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(Cont.)

	Cost of living			Living standards
	Subsistence index (1830 = 100)	**Traditional index**	**Gootenberg's index**	**Welfare index (1 = subsistence)**
1822	144.9	146.9	164.0	
1823	139.9			
1824	128.1			
1825	126.3	121.4		1.3
1826	108.8	118.5	112.7	
1827	111.7	113.7	105.9	
1828	107.5	106.1	102.3	
1829	105.1	104.4	98.3	
1830	100.0	100.0	100.0	1.6
1831	102.2	100.4	96.7	
1832	94.2	93.6	92.1	
1833	100.9	99.3	100.4	
1834	99.6	97.6	94.7	
1835	99.6	97.1	94.4	1.6
1836	111.3	105.0	101.2	
1837	112.3	103.8	103.3	
1838	106.2	98.4	103.2	
1839	103.8	97.2	102.8	
1840	92.3	86.6	88.0	1.7
1841	89.1	84.7	86.9	
1842	88.2	83.1	82.0	
1843	83.8	79.6	80.6	
1844	83.8	79.6	82.2	
1845	83.8	79.3	82.0	1.9
1846	83.6	78.6	81.5	
1847	92.0	85.5	86.8	
1848	85.8	79.6	80.9	
1849	85.6	78.2	82.5	
1850	82.1	78.5	82.1	2.4
1851	83.4	80.0	84.2	
1852	83.1	80.2	85.6	
1853	84.3	77.9	83.9	
1854	81.2	75.0	81.2	

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(Cont.)

1855	82.5	75.8	90.2	2.4
1856	94.9	83.9	109.1	
1857	94.8	84.7	108.4	
1858	95.4	84.8	110.2	
1859	116.8	109.8	104.1	
1860	132.3	125.0	134.2	1.5
1861	137.9	124.4	121.7	
1862	149.3	126.9	121.4	
1863	149.3	120.2	120.9	
1864	144.4	126.2	129.4	
1865	157.8	146.3	142.6	1.3
1866	154.0	147.0	154.1	
1867	154.5	145.7	157.2	
1868	155.1	145.5	158.8	
1869	169.3	159.0	160.0	
1870	165.8	156.3	162.9	1.2
1871	206.2	188.8	164.3	
1872	222.4	206.2	168.4	
1873	220.3	205.4	172.7	
1874	218.9	203.4		
1875	216.9	202.3		1.1
1876	216.3	200.5		
1877	215.1	200.1		
1878	215.3	199.1		
1879				
1880				
1881				
1882				
1883				
1884	216.9	192.2		
1885	201.4	188.9		1.2
1886	202.3	188.3		
1887	202.7	189.1		
1888	202.8	189.2		
1889	202.1	189.3		
1890	199.9	186.7		1.2

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(Cont.)

	Cost of living			Living standards
	Subsistence index (1830 = 100)	**Traditional index**	**Gootenberg's index**	**Welfare index (1 = subsistence)**
1891	201.4	186.9		
1892	203.0	187.2		
1893	202.5	187.5		
1894	202.8	187.1		
1895	204.1	182.8		1.2
1896	202.7	182.2		
1897	201.9	182.6		
1898	202.5	182.3		
1899	204.3	182.8		
1900	207.1	184.8		1.1

Source: see text.

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